Opening Up International Trade in Eastern European Countries. Consequences for Aggregate Trade Flows in the Rhine-Main-Danube Area

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1. Introduction

The collapse of Eastern Europe's bureaucratic economic system is among the most dramatic events of the current epoch. A central element of the revolutions in most of these countries is a total reversal of economic policy from central planning to a market orientation. There is a broad agreement on the major steps that have to be undertaken to transform a socialist economy into a market economy, including monetary stabilization, demonopolisation, liberalizing domestic markets, and liberalizing trade (for a discussion on these issues, see, for example, Siebert, 1991). The major disagreements focus on the appropriate sequencing and the speed with which the various measures should be implemented.

To the extent that economic reforms proceed successfully, Eastern European countries are going to be integrated into the world economy, and new patterns of trade with market economies will emerge. Trade during the 1990's will be shaped by two main developments. The first is the progressive liberalization of the East European countries' trade regimes. The second is the official dismantling of CMEA (Council for Mutual Economic Assistance) trading arrangements beginning in 1991. From these developments two major types of effects may be expected (Collins and Rodrik 1991). First, liberalization will lead to an overall expansion of East European countries' trade either through an increase in openness or through an expansion of output (volume of trade effect). Second, as CMEA countries reform their economies and restructure their trade regimes, they are likely to trade less with each other and more with market economies, especially with Western Europe (direction of trade effect). The opening up of Eastern European economies to commerce will introduce new supplies of goods and export market opportunities at a scale and speed that is quite unprecedented in modern history.

There have been several recent studies on the implications for the world economy (for example, Collins and Rodrik 1991, Hamilton and Winters 1992). In contrast, this current study is more limited in scope. First, the focus is only on trade effects, and, second, trade implications are being analysed only with respect to a sample of Eastern European and Western European countries, namely those located in the Rhine-Main-Danube (RMD) area in the wider sense. The Rhine-Main-Danube waterway system connects members of the former Council for Mutual Economic Assistance (CMEA or COMECON) Romania, Bulgaria, Hungary, the Czech and Slovak Republics, and Yugoslavia and its successors with Austria, Germany, Switzerland, France, Belgium-Luxemburg and the Netherlands. Moreover, this waterway is likely to become important for Western European countries' trade with Greece and Turkey. The aim of the study is to give quantitative estimates of the impact which a successful economic transformation in the former socialist countries will have on the RMD-trade pattern on the long run.

2. The Basic Modelling Approach

Economic theory provides rather poor advice about the volume and direction - as opposed to the composition - of international trade. But these issues are important, both economically and politically. In this paper we explore the potential volume and direction of RMD-trade using a simple, but evidently robust model of bilateral trade flows, the gravity trade model.

The model describes the trade flow X_{ij} from a particular country i of origin to a particular country j of destination. Typically, three types of factors are included that contribute to a quantitative explanation of the size of the trade flow between any pair (i,j) of countries:

- economic forces at the flow's origin, i.e. factors indicating the total potential supply of the exporting country i,
- economic forces at the flow's destination, i.e. factors indicating the total potential demand of the importing country j, and
- economic forces either aiding or resisting the flow's movement between the two countries concerned (i.e. link attributes).

The major factor determining potential supply of country i is its domestic product (Y_i). A country's potential demand is governed by the same economic forces as those determining potential supply. Higher income suggests higher demand. The third group of variables are link variables reflecting either aiding or resisting trade between i and j. Major natural obstacles to international trade are transportation and transaction costs. It can be assumed that the availability of information decreases and its costs increases, with distance. Correspondingly, the extent of trade between two countries will be negatively correlated with geographic distance between them. Geographic distance is measured in terms of distance D_{ij} from the economic centre of i to that of j. Geographical distance may have an impact even if transportation costs play a minor role today. These costs were important some decades ago and led to well established contacts in international trade (see Peschel 1981, Bröcker and Rohweder 1990).

The existence of common borders may also contribute to better business information, greater familiarity with laws, institutions, habits and language of the partner country (Balassa and Bauwens 1988). Thus, neighbouring countries can be expected to have an additional stimulus to trade. Perhaps more important, adjacent countries are likely to experience significant additional amounts of international trade in the form what are essentially locally traded goods (Aitken 1973). The separate introduction of distance and border variables permits testing the hypothesis that common borders have economic significance for the trade beyond that of distance (Balassa and Bauwens 1988). The existence of common borders is represented by a dummy variable D_B, the adjacency

dummy, which is one if i and j share a common border. The dummy, thus, reflects reductions in both cultural and transportation frictions between adjacent countries and above the distance effect.

Table 1: The Gravity Model of Exports from Country i to Country j

Variable	Proxy Variable	Hypotheses The Volume of Trade from i to j correlates
Country Specific Variables		
Potential Supply of the Exporting country i	GDP of i (Y_i)	**positively** with the average GDP in i
Potential Demand of the Importing Country j	GDP of j (Y_j)	**positively** with the average GDP in j
Link Specific Variables		
Transportation Costs from i to j	Road Distance from i to j (D_{ij})	**negatively** with increasing distance from i to j
Economic Horizon of Country i	Border Dummy (D_B)	**positively** with existence of common borders
Trading Preference Areas	EC-EFTA Dummy (D_E) CMEA Dummy (D_C)	**positively** with trade preferences and **negatively** with trade barriers
Cross-Country Differences in Aggregate Price Levels from i to j	Cross-Country Specific Unit Values of Exports (P_{ij})	**negatively** with increasing unit values
Similarity of Demand Structures in i and j	Difference of GDP of i and j (Y_{ij})	**negatively** with increasing dissimilarity

The principal artificial obstacles to trade are trade policies. Here the critical issue is the extent to which such barriers affect trade flows differentially. For our purposes two trading preference areas matter: first, the European internal market (i.e. the European Community and European Free Trade Association combined) and the Comecon. Dummy variables D_E and D_C are included to represent participation in these trading preference areas. The dummies equal one for pairs of countries belonging to the respective area, and zero otherwise. Other variables describing link attributes between country i and country j and considered in this study are aggregate price levels, approximated in terms of export unit values, and similarity of average incomes used as an index of similarity of demand structures. The more similar the demand structure of two countries i and j, the more intensive, potentially, is the trade between these countries (Linder 1961).

Formally, the model describing the trade flow from i to j in terms of the framework outlined in Table 1 may be characterized as follows:

$$X_{ij} = A_i \ (Y_i)^{\alpha_1} \ (Y_j)^{\alpha_2} \ F_{ij} \qquad (1)$$

where X_{ij} is the US dollar value of the flow from country i to country j ($i \neq j$), Y_i (Y_j) is the US dollar value of nominal GDP as a measure of income in i (j). A_i is an origin-specific constant, α_1 and α_2 parameters. F_{ij} represents link attributes between i and j, reflecting various costs aspects of doing business. The link related function F_{ij} is specified as follows

$$F_{ij} = (Y_{ij})^{\alpha_3} \ (P_{ij})^{\alpha_4} \exp(\alpha_5 D_{ij} + \alpha_6 D_B + \alpha_7 D_E + \alpha_8 D_C) \qquad (2)$$

where Y_{ij} denotes similarity in level of GDP between i and j as a measure of similarity of demand structures in i and j, P_{ij} aggregate price levels approximated by export unit values, D_{ij} transportation costs from i to j approximated by distance from the economic centre of i to that of j, D_B the adjacency dummy, D_E and D_C the preference dummies. Linnemann (1966), Aitken (1973), and more recently Hamilton and Winters (1992) used a similar specification of the gravity trade model, but included exporter and importer populations, while excluded prices.

The model refers to countries' total trade and may be estimated on cross-section data referring to a single year or to a time period. It may be thought of as providing a long-run equilibrium view of trading patterns (Hamilton and Winters 1992). A microeconomic foundation of gravity type models of international trade like that outlined in equations (1)-(2) may be found in Bergstrand (1984). He shows that such models can be derived from a general equilibrium world trade model by making certain simplifying assumptions, including perfect product substitutability, and identical utility and production functions across all countries.

3. Model Estimation and Results

The usual approach to estimating (1)-(2) is to assume that a normally distributed multiplicative error term applies. In this case, OLS can be applied after a logarithmic transformation. The model is estimated on data from 1990. The trade data used in the investigation refer to the total merchandise trade and are expressed in $ US millions. The data were obtained from the UN world trade computer database. Export unit values were taken from the same source. The GDP data (measured in $ US million) came from the World Bank database, probably the most reliable in the field. But even in this case one has to realize that the estimation of Eastern European countries' GDP is tricky because there is no generally aggreed-upon measure of GDP for socialist and former socialist countries. Distances were measured in road distances between the economic centres.

The estimates reported in Table 2, support the hypotheses that have been put forward. All the coefficients have the expected signs, and all the coefficients - except the differences in aggregate price levels - are statistically different from zero at the 5% level, the measure of differences in size only at the 10% level of significance. The negative coefficient supports Linder (1961) that two countries will trade the more with each other, the closer their demand structures resemble each other. But the effect is very mild. The whole set of variables has a considerable explanatory power.

Table 2: Estimates of the Trade Flow Model 1990
(dependent variable: ln of export from i to j)

Variable	Coefficient	t-Statistic
Constant (A_i)	$1.24.10^{-12}$	9.85
ln Y_i	0.96	11.34
ln Y_j	1.01	11.83
ln ΔY_{ij}	-0.14	-1.91
ln P_{ij}	0.06	0.63
D_{ij} (10^{-3})	-0.36	-3.52
Dummies		
D_B	0.73	4.09
D_E	0.67	3.54
D_C	1.35	4.87
R^2 (adjusted)	0.85	

We find strong income effects on trade with elasticities around unity, which accords well with other studies (Collins and Rodrik 1991, Johansson and Westin 1991, Hamilton and Winters 1992). Reparameterising the equation in terms of income per head shows, ceteris paribus, similar positive income effects. As in all gravity models applied to international trade data so far, distance is an important variable, but here by far not the most important explaining variable. Trade declines by 30% per thousand kilometers. The estimated coefficient of the neighbourhood dummy shows that, other things being equal, trade between neighbouring countries is about two times as high as trade between non-neighbours. The estimate is highly significant. Both coefficients on preferential trade and integration arrangements are significantly different from zero. The coefficient for the dummy D_C point to the distorted trade structure of the Eastern European countries oriented at the COMECON and not at the international market. No doubt, after the official collapse of the COMECON in 1991 this effect will evaporate in the course of time and the Eastern European countries will increasingly orient themselves towards the West. But more than four decades of intra-CMEA specialisation has surely created some production complementarities among the Eastern European countries which will certainly limit the reorientation towards Western European markets (Collins and Rodrik 1991). The EC-EFTA preference area has generated significant trade incentives, but its trade promoting role appears to be much less pronounced. Hence, Eastern

European countries should not expect to gain a huge amount in terms of trade volume from favoured access to the European internal market. Finally, it is important to note that the model can not distinguish between trade creation and trade diversion (Hamilton and Winters 1992), so that one certainly can not generalize from the increases in intra-preference area trade recorded in Table 2 to increases in welfare.

4. Predicting Size and Direction of Trade

In this section we give quantitative estimates of the impact which a successful economic reform in the Eastern European countries will have on the long run on aggregated trade floes within the RMD-area. For quantifying the impact of a successful reform we consider three scenarios for real incomes in Eastern European countries: a short term scenario for 1995, a medium term scenario for 2000 and a catch-up long term scenario which assumes that Bulgaria, Romania and (the former) Yugoslavia reach the same level of per capita income as Greece in 1990, and Hungary and (the former) Czechoslovakia as the average of the Southern EC-countries in 1990.

Table 3: Three Scenarios for Real Income

Model Variable	*Short Term Scenario* (1995)	*Medium Term Scenario* (2000)	*Long Term Scenario* (2015)
Gross Domestic Product (GDP)	*Western Countries* 1991-92: actual figures 1993-95: 2 % increase p.a.	*Western Countries* 1996-2000: 2 % increase p.a.	*Western Countries* 2001-2015: 20 % total increase
	CSFR and Hungary 1991-92: actual figures 1993-94: 4 % increase p.a. 1995: 6 % increase (CSFR) 1995: 4 % increase (H)	*CSFR and Hungary* 1996-2000: 6 % increase p.a.	*CSFR and Hungary* reach the level of per capita income of South of EC in 1990
	Bulgaria, Romania, Yugoslavia 1991-92: actual figures 1993: -10 % decrease (BG, RO) 1993: -20 % decrease (YU) 1994: -5 % decrease (BG, RO) 1994: -10 % decrease (YU) 1995: -5 % decrease	*Bulgaria, Romania, Yugoslavia* 1996-97: 4 % increase p.a. 1998-2000: 6 % increase p.a.	*Bulgaria, Romania, Yugoslavia* reach the level of per capita income of Greece in 1990

CSFR = Czech and Slovak Republics, H = Hungary, BG = Bulgaria, RO = Romania, YU = Yugoslavia and successors

The assumptions made for the scenarios are outlined in Table 3. They are based on the view that the transition from a planned to a market oriented economy is associated with a specific development in output and employment, i.e. a J-curve in output and employment with a dip, a valley or a deep gorge, where output and employment will fall first and then start to rise. The shape of this J-curve is

not exactly known, but relevant for the political economy of transition and, thus, for the scenarios. Clearly, the shape depends on the inefficiency of the existing firms, on the speed and methods of privatisation, on the speed and methods of privatisation with which new firms come into existence, and on the conditions of the process of industrial restructuring including the opening up of the economy to the international diversion of labour (Siebert 1991). Of course, the state of reforms differs between the countries considered in this study. In Hungary, tentative reforms in the past and traditional openness of the country to the West put Hungary into a privileged position in Eastern Europe. But industrial reorganisation has hardly started yet. The Czech and, to a much less extent the Slovak Republic, seems to attempt to establish the institutional infrastructure first. Czechoslovakia was one of the countries with the most advanced industry in the COMECON. In contrast, Bulgaria and Romania and Yugoslavia - which broke apart into its component republics during the latter part of 1991 - lack behind and show less favourable development prospects. Consequently, country specific assumptions have to be made in the scenarios (see Table 3).

Table 4: Actual and Predicted Export Figures for the RMD-Countries
(in 1990 billions of US dollars)*

Countries	Actual Export Figures**	Model Predictions			
	1990	Short Run 1995	Medium Run 2000	Long Run 2015	Change (in % per year)
Countries in the Catchment Area of the Danube					
West Germany	176.7	202.6	250.0	424.0	3.6
Austria	25.9	29.1	37.9	90.9	5.2
Czech and Slovak Republics	4.7	3.4	9.0	63.4	11.0
Hungary	4.8	4.4	11.0	73.7	11.5
(former) Yugoslavia	6.5	2.6	3.4	49.2	8.4
Romania	1.9	1.1	1.4	22.1	10.3
Bulgaria	1.1	0.4	0.6	7.6	8.0
Countries in the Catchment Area of the Rhine					
Switzerland	27.6	30.8	37.9	62.9	3.3
France	69.0	80.9	98.8	154.2	3.3
Belgium-Luxembourg	67.9	80.0	96.6	141.7	3.0
The Netherlands	69.3	81.0	98.2	146.0	3.0
Southeast European Countries in the Wider Catchment Area of the Danube					
Greece	3.3	3.6	4.5	8.4	3.8
Turkey	5.0	6.2	7.6	22.3	6.2
Total	463.8	526.0	656.8	1,266.4	4.1

* without trade relations Romania-Bulgaria and Bulgaria-Romania

** World Bank (1992)

Table 5: Actual and Predicted Import Figures for the RMD-Countries
(in 1990 billions of US dollars)*

Countries	Actual Export Figures**	Model Predictions			
	1990	Short Run 1995	Medium Run 2000	Long Run 2015	Change (in % per year)
Countries in the Catchment Area of the Danube					
West Germany	121.1	138.3	172.5	305.0	3.8
Austria	31.5	36.3	45.8	91.7	4.4
Czech and Slovak Republics	4.9	3.6	10.1	66.7	11.0
Hungary	4.7	4.4	11.6	67.9	11.3
(former) Yugoslavia	9.9	4.2	5.5	72.9	8.3
Romania	1.8	1.0	1.3	20.1	10.1
Bulgaria	1.4	0.7	0.9	10.0	8.2
Countries in the Catchment Area of the Rhine					
Switzerland	39.4	44.6	54.0	80.3	2.9
France	98.8	117.0	141.6	215.3	3.2
Belgium-Luxembourg	69.3	81.5	98.7	143.7	3.0
The Netherlands	64.9	75.9	92.1	136.8	3.0
Southeast European Countries in the Wider Catchment Area of the Danube					
Greece	8.6	9.7	11.9	20.4	3.5
Turkey	7.4	8.8	10.7	35.6	6.5
Total	463.8	526.0	656.8	1,266.4	4.1

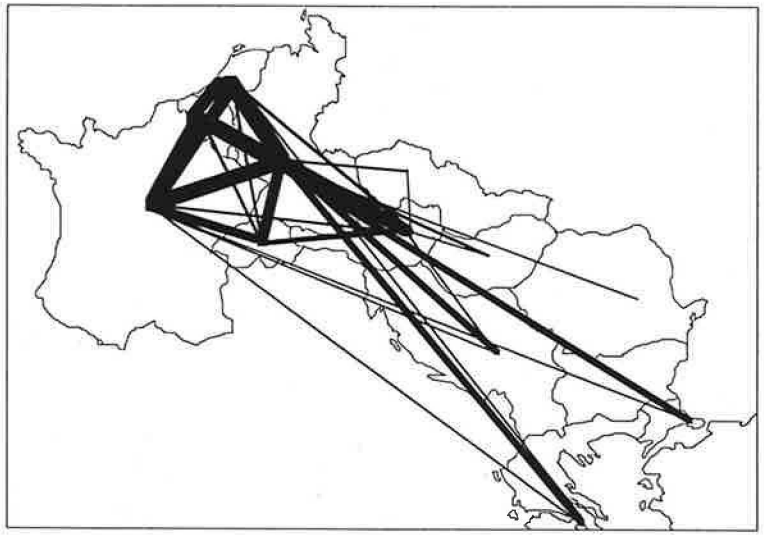
* without trade relations Romania-Bulgaria and Bulgaria-Romania ** World Bank (1992)

Table 4 and 5 report our estimated potential export and import figures for each of the RMD-countries along with the estimation of 'actual' export and import for 1990. Reported export and import figures substantially exceed predicted ones for 'Yugoslavia', Romania and Bulgaria until the end of this century. The long run effect naturally will be spread out over a number of years. The trade volume in the whole RMD-area will grow from 463.8 billions of US dollars in 1990 over 526.0 in 1995 and 656.8 in 2000 to 1,266.4 at current prices in the long run. The relative success of the East European RMD countries will become evident only in the beginning of the next century. Their share in trade potential of the RMD-area first declines from 9% in 1990 to 4.9% in 1995, increases then over 8.3% in 2000 to roughly one third in the long run, when these countries have realised Southern European levels of 1990-incomes.

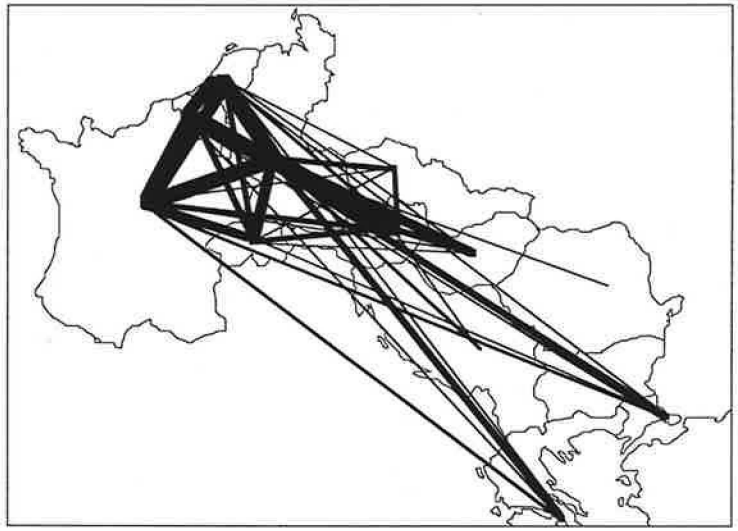
The results in Table 6 indicate the importance of international trade to the emergent market economies - and imply that any failure to realize the potential increases in trade could have serious implications for their generation of income or satisfaction of demand. Certainly the figures suggest that sound international trade relations are likely to offer a far greater stimulus to the Eastern RMD-

Figure 1: Spatial Configuration of Bilateral Trade Flows in the Rhine-Main-Danube Trading Area 1990, 1995, 2000 and 2015

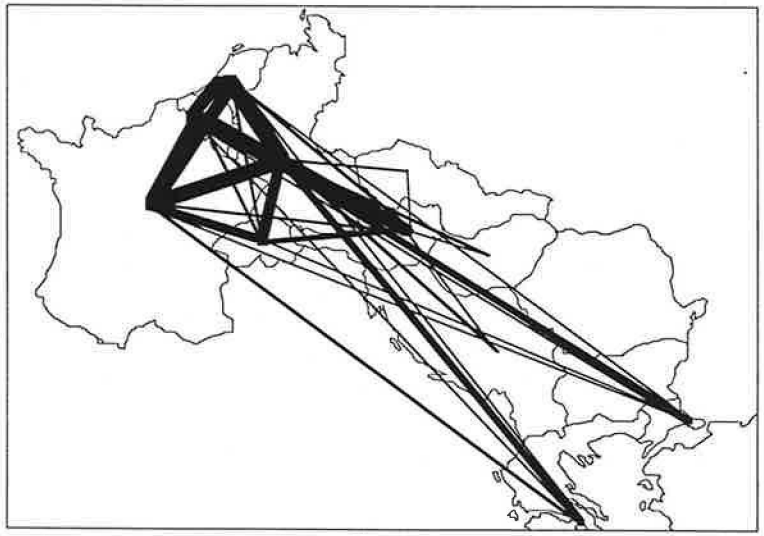
Initial State: 1990



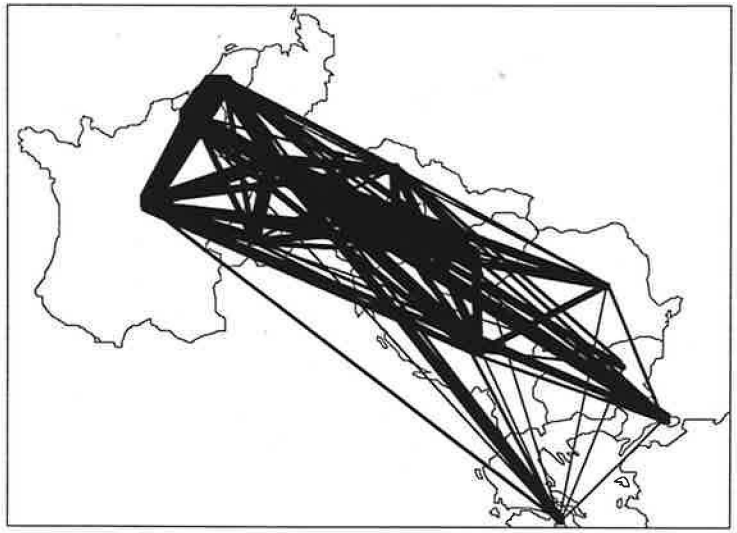
Medium Term Forecasting Horizon: 2000



Short Term Forecasting Horizon: 1995



Long Term Forecasting Horizon: 2015



Relation Specific Trade Volumes
(in billions of 1990 US dollars,
values below 1.0 billion
US dollars are suppressed)

- 1.0 - 2.4
- 2.5 - 4.9
- 5.0 - 9.9
- 10.0 - 19.9
- 20.0 - 49.9
- 50.0 and more

countries than could any conceivable aid flow. Every 1% on GDP will boost imports and exports by roughly 1% (see Table 2).

Table 6: East European Countries' Openness Ratio

	Exports as Percentage of GDP			
Country	1990	1995	2000	2015
Czech & Slovak Republics	9.6	7.8	15.5	29.8
Hungary	16.4	15.6	30.3	51.5
(former) Yugoslavia	8.9	9.3	10.0	32.9
Romania	5.1	4.6	4.8	15.1
Bulgaria	5.5	3.3	4.1	13.6

The collapse of COMECON trading arrangements and the growing influence of market forces in the East European RMD-countries is likely to lead to potential trade flows as estimated by the model and displayed in Figure 1. What this figure shows most forcefully is the substantial increase in trade on the one side and the increasing orientation of the Eastern European countries towards Western European markets. Both developments will be large by any definition.

5. Conclusions and Outlook

The discussion in this paper has focused on the overall volume and direction of Western and Eastern European RMD-countries. The long term changes we have predicted are dramatic for the Eastern European, but also important for the Western European countries and offer scope for new specialisation and economies of scale on a scale approaching the opening up of the new world. It is appropriate to end on a cautionary note that there is a great range of uncertainty with respect to the likely developments in each of the RMD-countries. The figures we have derived might end up wide of the mark. They offer only broad and trend patterns, not precise indications of year-by-year developments. Even so the numbers are useful in assisting frame the issues and focus thinking of the potential impact. We conclude by summarizing some major aspects of the study. Our model predictions suggest that given the assumptions made in the catch-up scenario the Eastern European RMD-countries should expect to have an excess of imports over exports, i.e. to have small trade deficits. But the predicted imbalances are rather small relative to total trade in the RMD framework and, thus, would not raise serious financing difficulties.

In view of their small initial share Eastern European countries most likely will increase their shares of the RMD-trade in the long run at the expense of the Western European RMD-countries. Eastern European countries have a comparative advantage in sectors like textiles and clothing, iron and

steel, and agricultural products. Although the EU has removed most quantitative restrictions on Eastern European imports in the early 1990s, restrictions (tariffs and quota) on products in the above mentioned sectors remain, especially in the case of Bulgaria and Romania. The removal of these restrictions is one of the top priorities of Eastern Europe. But it seems to be unlikely that the EUwill allow import penetration ratios to double or triple in the near future, even if the export volumes rise correspondingly.

It can not be overemphasized that any attempt of Western European countries as a whole to sell in Eastern markets without accepting their output in return runs the risk that the transition of socialist economies into a market economy might fail (Hamilton and Winters 1992). Western European countries must offer free market access if Eastern Europe is to progress in the transition. When the reforms succeed there will be a positive supply shock for the world economy, spread over longer periods of time (Siebert 1991). Of course, the shifts will not be spread evenly across commodities. The future product composition of trade flows is unlikely to be a simple radial blow-up of today's composition.

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